

# Water Quality

Water quality is monitored at sites on the Salmon River, Thompson Creek, and Squaw Creek. There are two monitoring sites located on the Salmon River and Squaw Creek, one upstream of mine disturbance, and one downstream of mine disturbance. There are four monitoring sites on Thompson Creek, one upstream of mine disturbance, one below the confluence with Buckskin Creek, one above the confluence with Pat Hughes Creek, and one below the confluence with Pat Hughes Creek. Water quality samples are taken based on the hydrograph. Samples are taken in the spring before peak flow, during spring peak flow, summer low flow, and fall low flow. The parameters analyzed are in accordance with a National Pollutant Discharge Elimination System (NPDES) permit.

The tables below present water quality data for these parameters (with the exception of total suspended solids) from 1998 to 2008 (October 1998 is when Thompson Creek Mine started using lower detection limits for water quality analysis). The tables present a fraction for each parameter, which is the number of times Idaho water quality standards have been exceeded over the number of samples that have been taken at that location. Past exceedances for selenium in Thompson Creek have arisen when flow in Thompson Creek is low. To avoid potential in stream water quality issues, water from the Buckskin drainage (including water from the Buckskin waste rock facility) is diverted into the Thompson Creek pipeline to be used in the mill when flow in Thompson Creek drops below 7 cubic feet per second.

## Salmon River

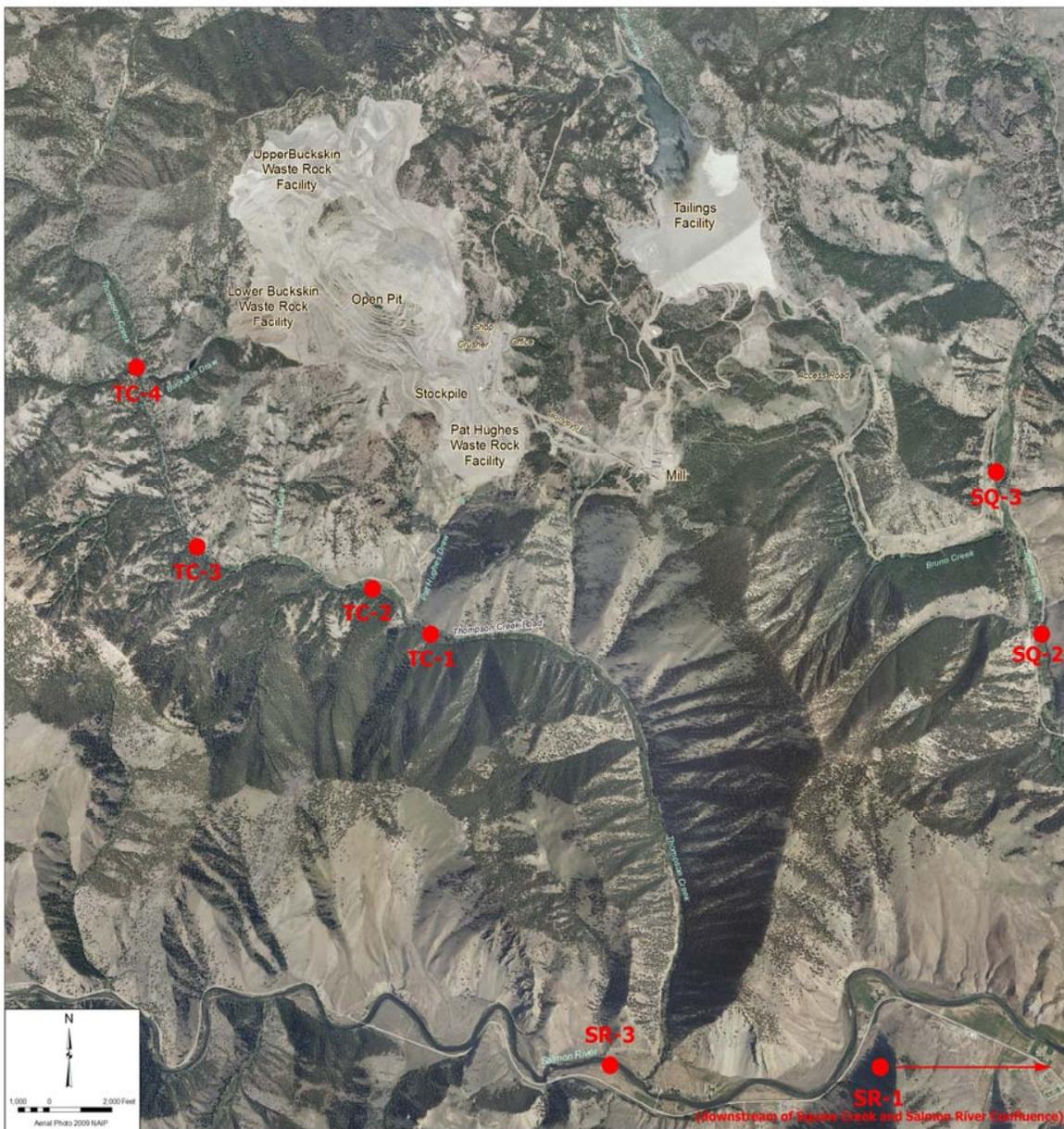
Site	Silver	Arsenic	Cadmium	Chromium	Copper	Mercury	Lead <sup>1</sup>	Selenium	Zinc	pH
SR-3	0/30	0/41	0/41	0/31	0/41	0/44	1/41	0/41	0/41	0/44
SR-1	0/31	0/41	0/41	0/31	0/41	0/44	3/41 <sup>2</sup>	0/41	0/41	0/45

## Thompson Creek

Site	Silver	Arsenic	Cadmium	Chromium	Copper	Mercury	Lead <sup>1</sup>	Selenium	Zinc	pH
TC-4	0/30	0/44	0/44	0/30	0/44	0/47	0/44	0/46	0/44	0/131
TC-3	0/38	0/43	0/43	0/38	0/43	0/46	0/43	7/47	0/43	1/129
TC-2	0/35	0/38	0/38	0/35	0/38	0/41	0/38	3/40	0/38	0/116
TC-1	0/30	0/42	1/42	0/30	0/42	0/45	1/42	5/47	0/42	0/129

## Squaw Creek

Site	Silver	Arsenic	Cadmium	Chromium	Copper	Mercury	Lead <sup>1</sup>	Selenium	Zinc	pH
SQ-3	0/31	0/39	0/41	0/31	0/41	0/45	1/41 <sup>3</sup>	0/42	0/41	1/207
SQ-2	0/31	0/41	0/39	0/31	0/39	0/46	0/39	0/40	0/39	0/122



<sup>1</sup> Increased dissolved lead was noted on 26 April 1999 at sites both upstream and downstream of the mine, including exceedances at sites SR-3, SR-1, and SQ-3, and increases at TC-4, TC-1, and SQ-2.

<sup>2</sup> One of the exceedances at SR-1 was on 26 April 1999 as described for footnote #1. Concerning the two other exceedances, one is likely lab error and the other is unexplained.

<sup>3</sup> The excursion noted occurred on 16 April 2008 and is likely a lab error.

\* Water quality data is summarized from Thompson Creek Mining Company's 2008 Annual Water Quality Report submitted to Idaho Division of Environmental Quality. Data has not undergone quality control and is not a thorough analysis of water quality.

# Thompson and Squaw Creek Fisheries



Fish populations have been monitored since 1980 at two sites (one upstream of mine disturbance and one downstream) on both Thompson Creek and Squaw Creek. Mine construction began in 1981 and mining began in 1983. Over time monitoring has expanded to include 2 additional monitoring sites on Thompson Creek (4 sites in total). However, long-term data only exists for the 4 sites shown on the map to the right, which is presented in separate graphs below. The data allows comparison of fish populations over the life of the mine, as well as between the upstream and downstream sites. A summary of the data is presented below for each species<sup>1</sup>.

**Shorthead Sculpin** – Shorthead sculpin have been collected each year at both long-term monitoring sites on Thompson and Squaw Creeks. There is a high level of natural variability between years; however, data analysis indicates that there are no statistically significant long-term increasing or decreasing trends at the sites on Thompson Creek. On Squaw Creek, there is no statistically significant long-term trend at the upstream reference site (SQ-3). However, there has been a statistically significant decrease in sculpin density over time at the downstream site (SQ-2).

**Cutthroat Trout / Rainbow Trout Hybrids** – Hybridization between westslope cutthroat trout and rainbow trout is common and fish in Thompson and Squaw Creek exhibit a range of characteristics of both species. Cutthroat-rainbow trout hybrids have been collected each year at both long-term monitoring sites on Thompson and Squaw Creeks. As with sculpin, there is high level of variability between years; however, high inter-annual variability is relatively common among trout populations in the western U.S. Further, there are no statistically significant upward or downward trends in population levels at the upstream or downstream sites on both creeks.

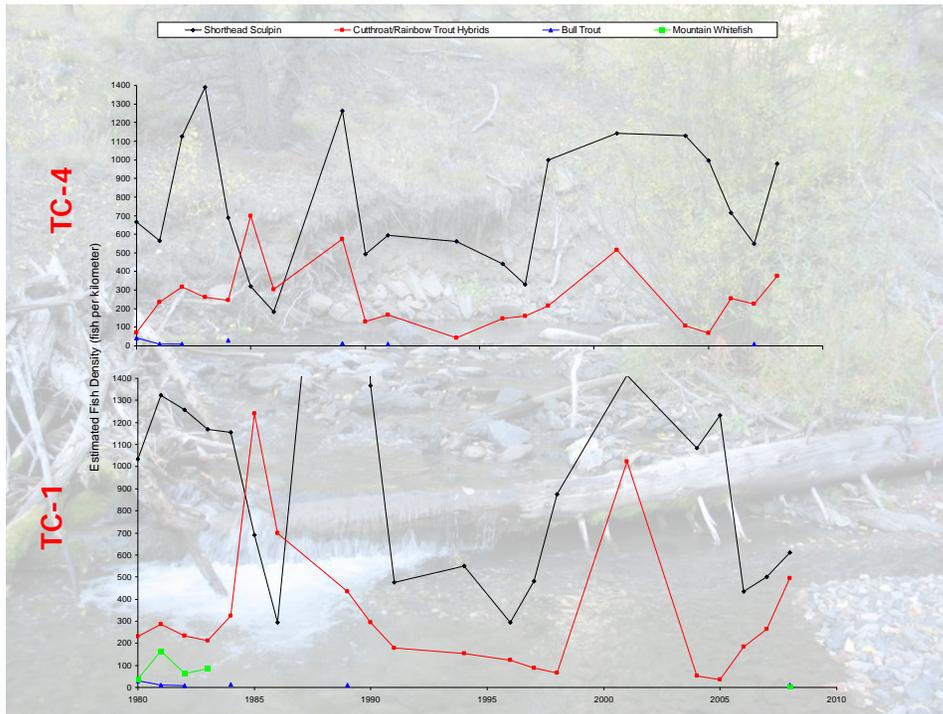
**Bull Trout** – In Thompson Creek, bull trout were present in low numbers at both sites between 1980 and 1991. However, bull trout were then not found at either the upstream or downstream sites until recently. A single bull trout was collected in 2007 for the first time since 1991 at site TC-4 and a single bull trout was collected at site TC-1 in 2008 for the first time since 1989. In Squaw Creek, bull trout have been present more consistently, although in low numbers.

**Mountain Whitefish** – At the upstream site on Thompson Creek (TC-4) mountain whitefish were present in 2007 for the first time since 1991. However, mountain whitefish have not been sampled at the downstream (TC-1) site since 1983, the year mining began. Mountain whitefish are collected more regularly in Squaw Creek, although in low numbers.

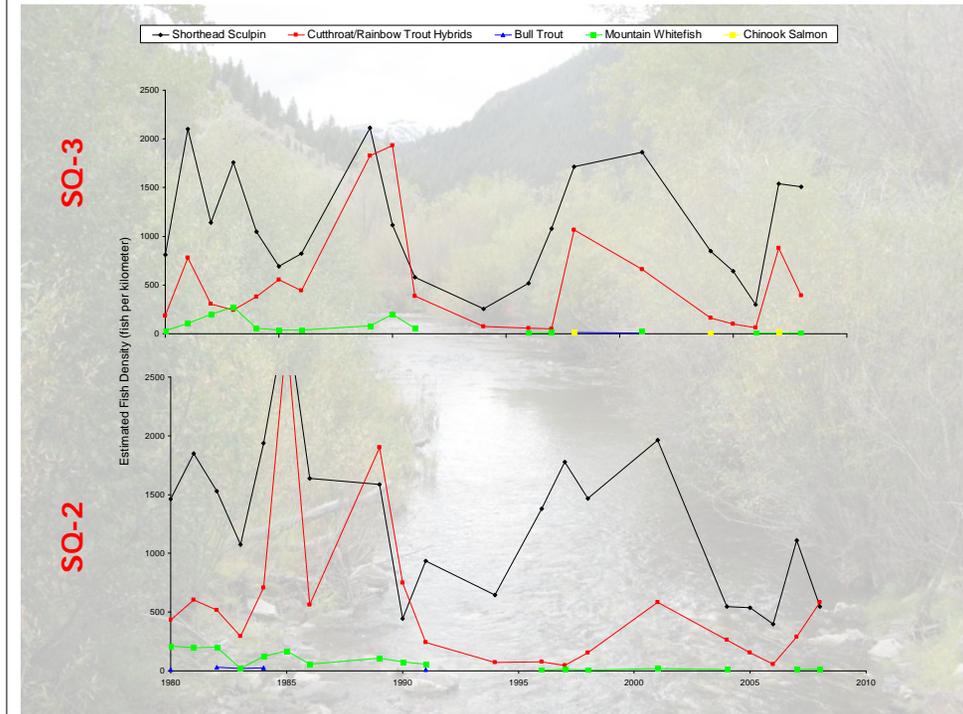
**Chinook Salmon** – Chinook salmon have not been present at either Thompson Creek site since sampling began in 1980 (chinook have been found in the lower reaches of Thompson Creek). Young chinook salmon were present at the upstream site (SQ-3) in 1998, 2004, and 2007. Chinook have not been present at the lower site (SQ-2) since sampling began in 1980.

<sup>1</sup>Fish data summarized from the *Aquatic Biological Monitoring of Thompson Creek and Squaw Creek, Eastern Oregon, 2008* prepared for the Thompson Creek Metals Company by GEI Consultants, Inc. Ecological Division. To ensure comparability, fish density estimates were produced from the result of only the first electrofishing pass at each sample location.

## Thompson Creek



## Squaw Creek

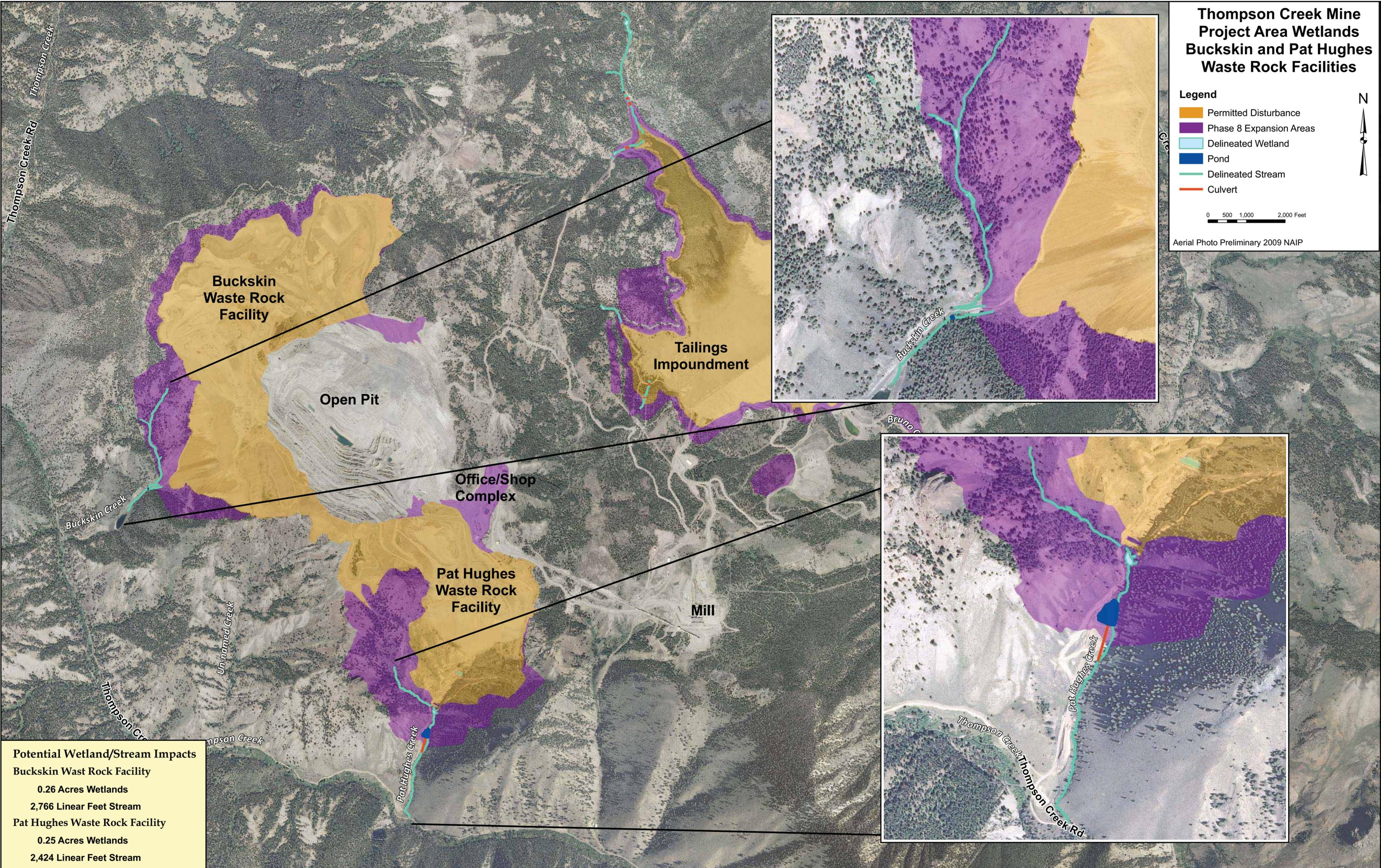


# Thompson Creek Mine Project Area Wetlands Buckskin and Pat Hughes Waste Rock Facilities

- Legend**
- Permitted Disturbance
  - Phase 8 Expansion Areas
  - Delineated Wetland
  - Pond
  - Delineated Stream
  - Culvert

0 500 1,000 2,000 Feet

Aerial Photo Preliminary 2009 NAIP



Potential Wetland/Stream Impacts	
<b>Buckskin Waste Rock Facility</b>	
0.26 Acres Wetlands	
2,766 Linear Feet Stream	
<b>Pat Hughes Waste Rock Facility</b>	
0.25 Acres Wetlands	
2,424 Linear Feet Stream	

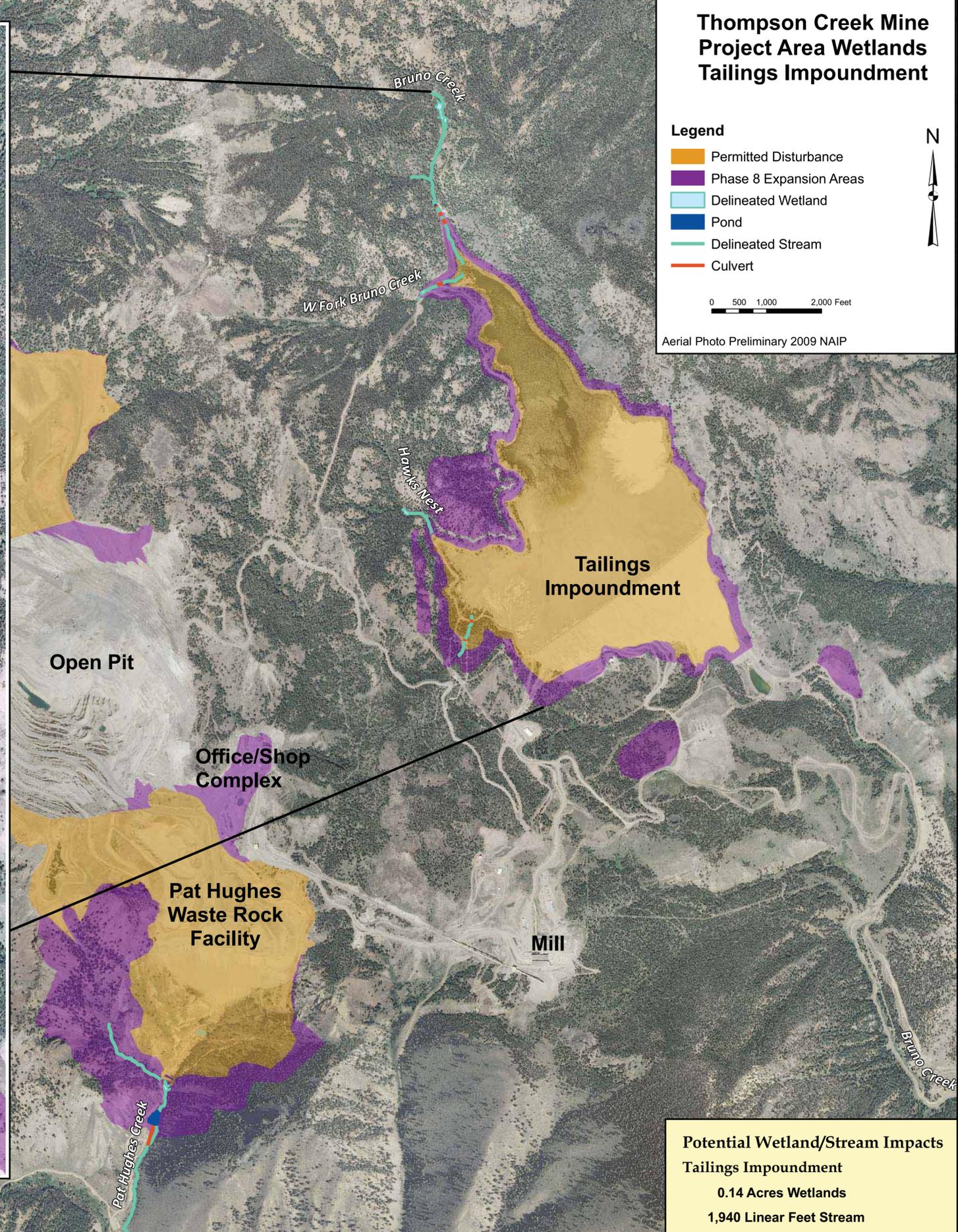
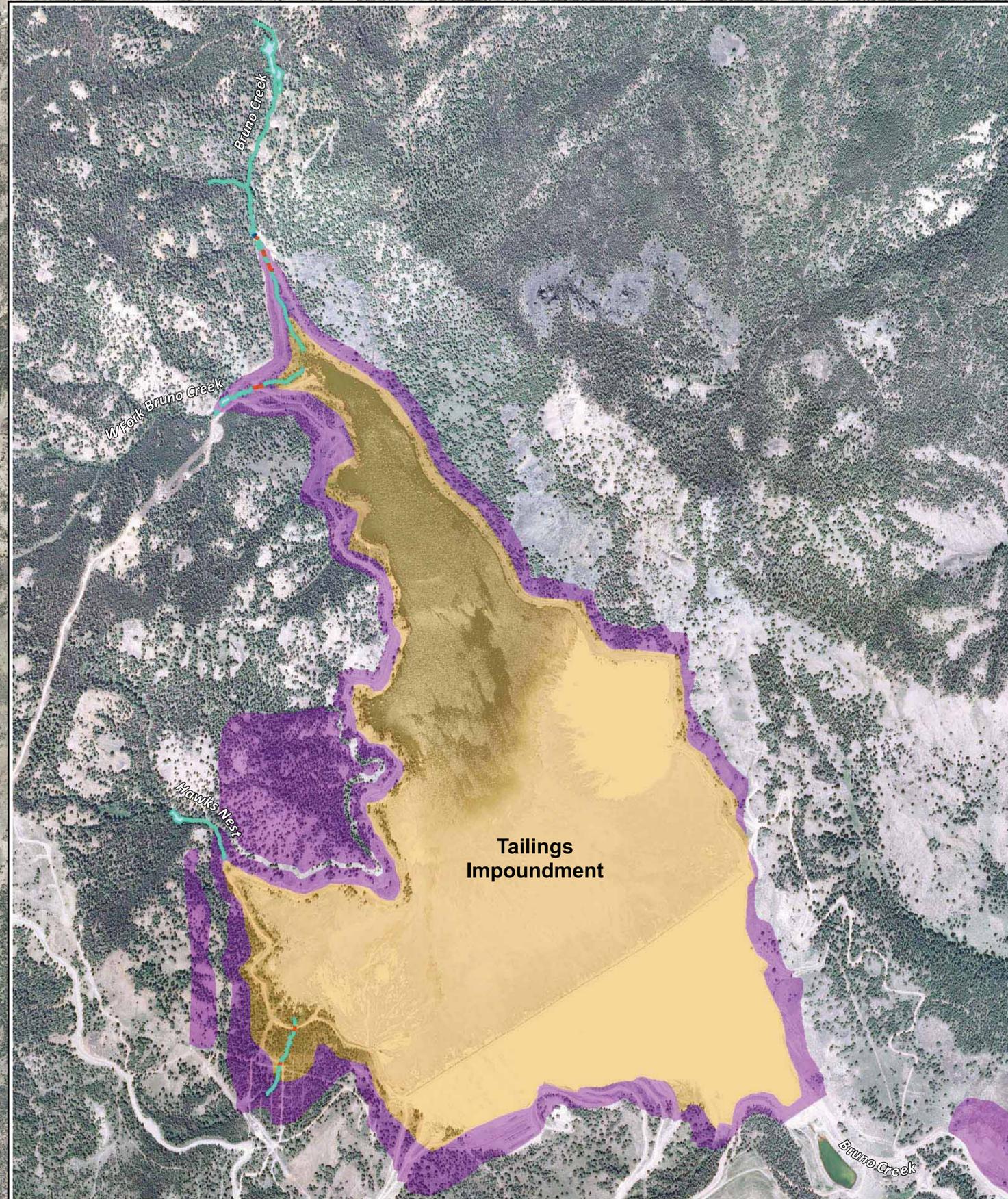
# Thompson Creek Mine Project Area Wetlands Tailings Impoundment

## Legend

- Permitted Disturbance
- Phase 8 Expansion Areas
- Delineated Wetland
- Pond
- Delineated Stream
- Culvert

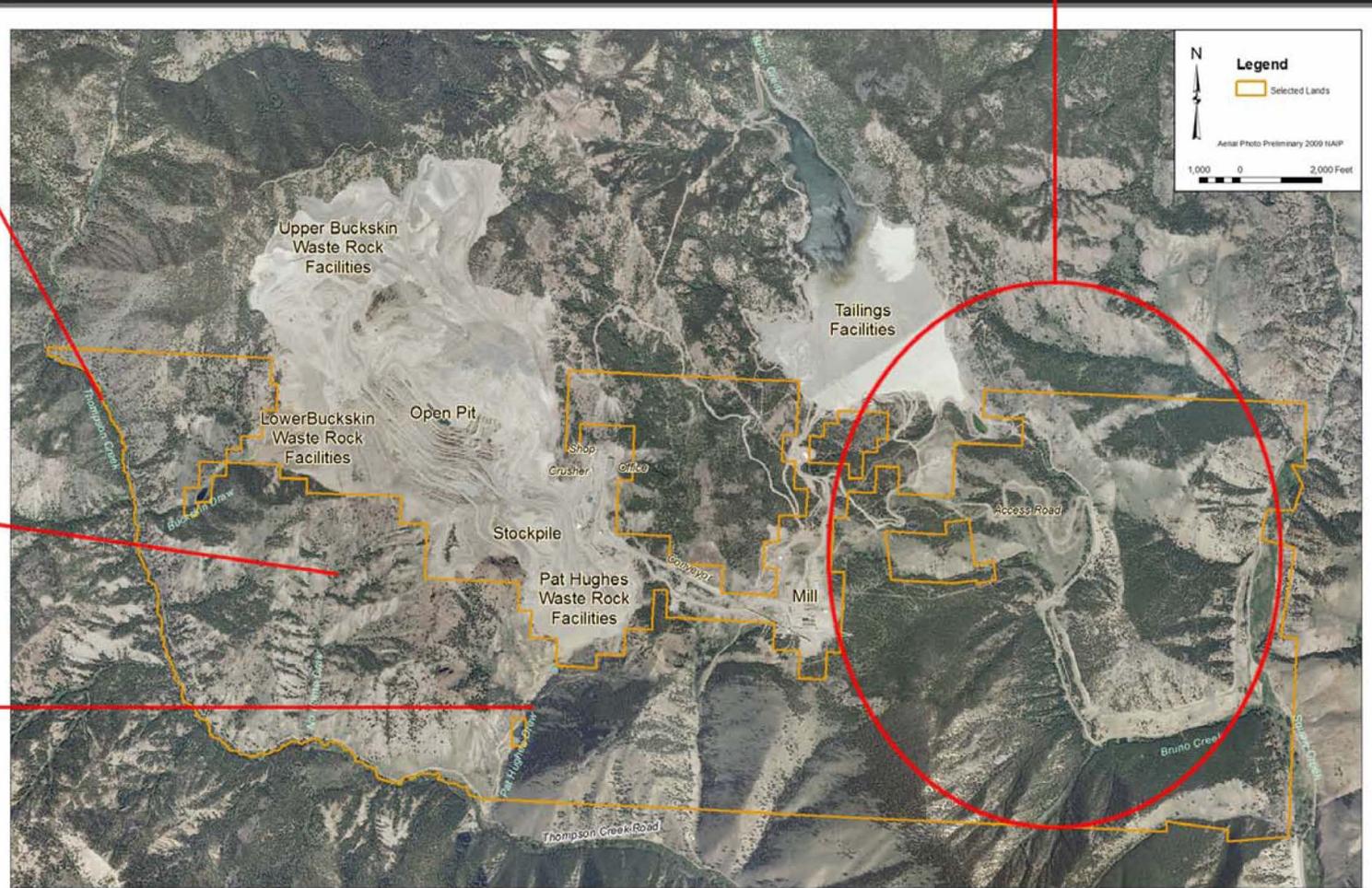
0 500 1,000 2,000 Feet

Aerial Photo Preliminary 2009 NAIP



**Potential Wetland/Stream Impacts**  
**Tailings Impoundment**  
 0.14 Acres Wetlands  
 1,940 Linear Feet Stream

# Selected Lands



# Broken Wing Ranch

## BLM Resource Advisory Committee Sub-Committee Management Recommendations

### Parcel A – Lyon Creek Meadow/Riparian Area

- Manage for wildlife and fisheries
- Restrict access to non-motorized use (except for admin. use)
- Increase water efficiency and quality in order to increase the amount of water in Lyon Creek for fisheries and riparian vegetation, while at the same time maintaining meadow

### Parcel B – Lyon Creek Pivots and Lyon Creek Pond

- Continue agriculture in these areas
- Remove pond to eliminate fish barrier

### Parcel C – Lyon Creek Main House

- Convert the facility to serve as a Field School for Boise State University and partners, or other environmental and outreach programs

### Parcels D, E, and F – Marafio Homestead and Fields

- Develop one site for use by Idaho Parks and Recreation (or other agency) as a campground, interpretive site, or other recreational facility capable of generating revenue
- Remove the Marafio home, which is beyond repair

### Parcels E, G, and I – Ranch and Sink Creek Facilities

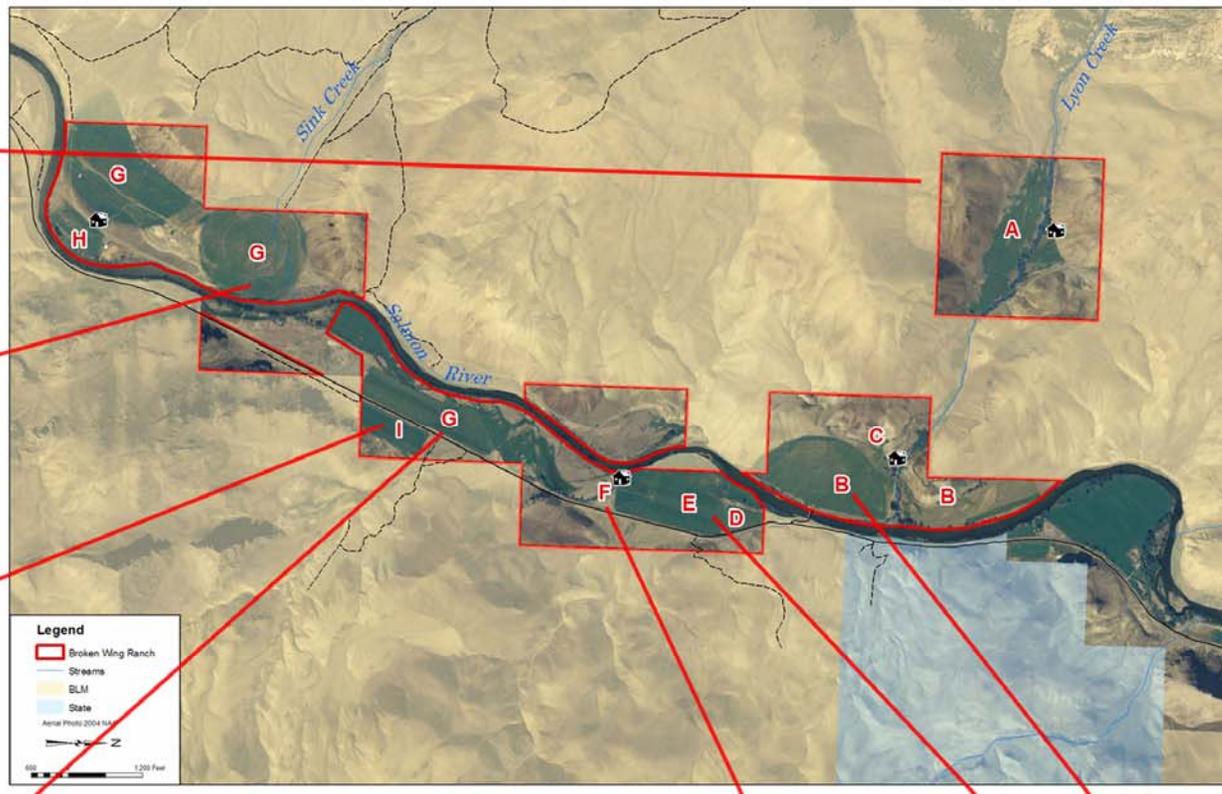
- Continue agriculture in these areas with the Sink Creek facilities maintained as housing for ranch managers
- Manage the ranch through collaboration with Custer County and other partners
- Develop stewardship agreements with Idaho Fish and Game, Boise State University, Native American Tribes, and others

### Historical Buildings

- Maintain historical buildings located in the Lyon Creek Meadow (Parcel A) and near the Marafio homestead as interpretive sites through a partnership with Custer County, Boise State University, Idaho Parks and Recreation, and others

### Salmon River Riparian Area

- Increase width of riparian vegetation such as cottonwood, willow, etc. through restoration and rest from grazing
- Fence riparian area to restore vegetation in areas where livestock would be present



# Garden Creek Property

